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v36 User Guide

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I N T R O D U C T I O N

1.1 GENERAL DESCRIPTION

The Imaging Systems Group Inc. V36 Thermal Plotter is a high-speed plotter suitable for office or field use. Using the latest technology, this 400 dpi plotter has been optimized to plot on thermal film or thermal paper without the need for inks, toner or chemicals. With the ability to accommodate 36" media widths, the V36 can handle a wide range of plotting requirements.

Interface parameter settings and other menu functions can be accessed from either the front panel or the remote host. It is capable of printing at speeds ranging from 1/4" per second to 1" per second.

The V36 prints in both raster and character modes, and contains a 96 ASCII character set. It interfaces easily with Versatec, (optionally) Centronics and (optionally) SCSI data sources.

1.2 MEDIA DESCRIPTION

The V36 uses roll thermal paper, and certain thermal film media. Media width is 36 inches. The V36 accommodates regular thermal paper, papers with a protective top coating, and thinner field-grade papers.

Contact The Imaging Systems Group Inc. for film recommendations.

1.3 ABOUT THIS MANUAL

Please read this manual before using the plotter, in particular the Installation and Operation Chapters.

Pay special attention to warnings, cautions and notes. The following conventions are used in this manual:

WARNING: Indicates possible bodily injury if procedure is not followed exactly.

CAUTION: Indicates possible equipment damage unless procedure is followed correctly.

NOTE: Indicates a general rule for a procedure, or an exception to a rule.

This symbol indicates an area of possible concern due to static discharge into the circuitry. When you see this symbol in the manual, please observe proper static precautions to minimize damage to the circuitry.

S P E C I F I C A T I O N S

2.1 PLOTTER CHARACTERISTICS

Plotter Width:	36 inch carriage
Effective Plot Width:	Up to 35.52”
Resolution:	200/400 dpi
Bytes per Scan:	Up to 1776 bytes
Command Mode:	Plot mode Print mode
Media Formats:	Roll
Plot Media/ Consumables:	Thermal sensitive paper and film Paper: Roll Film: Roll
Stepper Motor:	Micro step technology
Front Panel:	Full function alpha-numeric LCD

Front Panel User Functionality:

Vertical scaling
Contrast control
Hysteresis control
Manual plot speed
Plot width (byte count)
- variable up to 36”

Test plot, Test print
Form feed length adjust
203/406 dpi select (emulate)
Online/Offline
Manual advance
Manual cut/Auto cut
Mirror image

Front Panel Detection:

Media out
Top-of-form (TOF)
Auto head temperature feedback
Media measure

Plot Speeds:

Manual selectable speeds
- 0.25” per second
- 0.50” per second
- 0.75” per second
- 1.0” per second
- max speed paper

Interface:

Versatec Greensheet (Standard)

Options:

Fanfold paper guide
Media catcher
Centronics Interface
SCSI Interface

SPECIFICATIONS

2.2 POWER REQUIREMENTS

Auto Range Input:	110 v - 220 v AC 60/50 Hz
Current:	13 Amps nominal @ 110 v AC 6 Amps nominal @ 220 v AC

2.3 PHYSICAL CHARACTERISTICS

Dimensions:	Height: 39.5” Depth: 20” Width: 46”
Weight:	Net 150 lbs.

2.4 ENVIRONMENTAL CHARACTERISTICS

Operating Temperature:	32^0 to 95^0 F 0^0 to 35^0 C
Operating Humidity:	5% to 95% Non-condensing
FCC Approval:	Class A/CE (pending)

INSTALLATION

3.1 UNPACKING

Although shipments are thoroughly checked for completeness by Veritas, confirm that your plotter has the following:

1). Power cord.

2). Two spindle hubs (3" core media).

Confirm that any specified options are present, such as the data cable, media catcher or roll media.

Inspect the plotter and components for any damage that may have occured during shipment. Report any damage to the carrier of the shipment.

CAUTION: Keep the box and packaging for potential shipping later. During shipping or storage, place a length of thermal paper between the printhead and roller. This will prevent damage to the printhead if the plotter is powered on, and will stop dents from the printhead/ roller contact over a period of time.

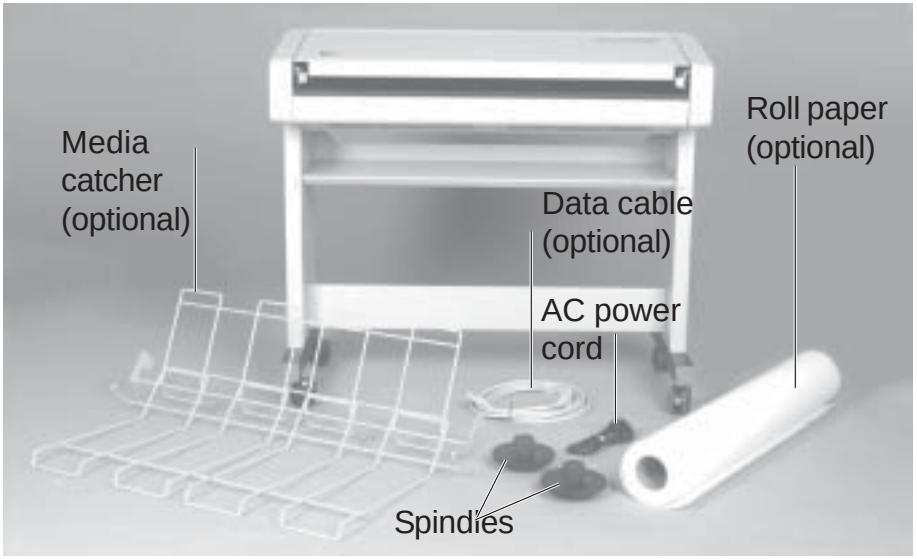


Figure 3.1. V36 components

3.4 INTERFACE SETUP

Plug the power cord into a grounded AC outlet only. Avoid sharing an outlet that is also powering other noise-generating equipment.

The V36 can be set for shortline (TTL transistor to transistor logic) or longline (differential) interface. The plotter is shipped with a Versatec interface set for longline unless otherwise specified. The shortline interface can be used for data cable lengths up to 50 feet.

For Centronics interface installation, See Appendix A. A SCSI (small computer system interface) is available. Please contact Veritas for information.

Changing the interface line setting

1). Loosen thumb screws on interface board as described in “Repair Procedures” Chapter 6.

2). Locate the ribbon cable.

3). Unplug the cable from its shortline and longline and plug it in the desired line connector as shown in Figure 3.16.

4). Slide card back in card cage slots and tighten thumb screws.

CAUTION: Do not attempt to plot or form feed without the print medium installed. This will damage the printhead and void the warranty.

3.5 MEDIA INSTALLATION

Installing roll paper/film

To install roll paper/film:

1). Release the lid by pulling lid latch towards you and upwards (see Figure 6.3). Repeat for other side. Open the plotter lid by lifting upwards.

2). Push the spindle hubs into place on each end of the roll.

3). Place the spindle hubs into the spindle blocks.

4). Place the roll so that the paper feeds from the bottom.

Figure 3.17. Paper/film installation

5). Guide the paper over the platen roller and under the black cutter bar and feed out the front.

6). When installing any thermal paper, ensure that the coated side of the paper is on top.

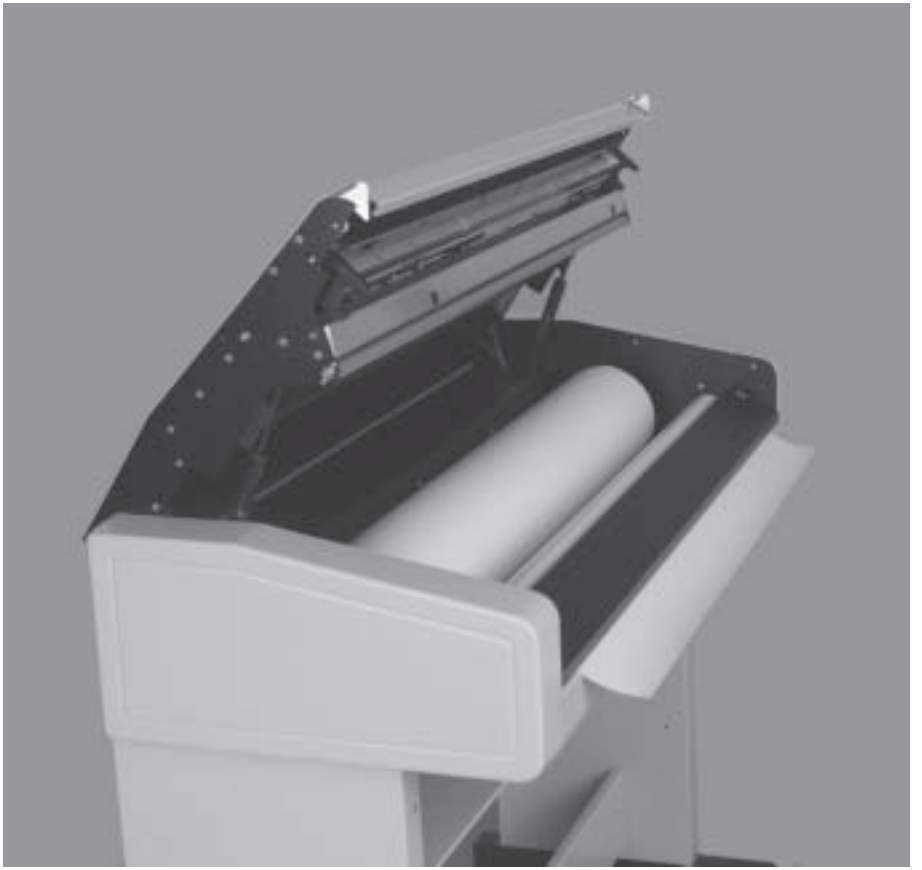


Figure 3.18. Media over the platen roller

Figure 3.19. Roll paper path

O P E R A T I O N

4.1 POWER SUPPLY PRECAUTIONS

Turn the plotter power switch OFF before doing any of the following:

1). Unplugging the plotter.

2). Cleaning the printhead.

3). Opening the plotter for maintenance or service.

4). Placing hands or tools near any internal parts.

WARNING: There are voltage hazards inherent in the printhead power supply and AC input wiring. Take reasonable precautions to avoid electrical shock.

CAUTION: Take care not to discharge static into the plotter. This may cause damage to the integrated circuits or to other electronic components. Use an approved method of dissipation or touching a grounded source.

4.2 USING THE CONTROL PANEL

To turn the plotter on, press the main power switch at the back right side of the plotter. The plotter will go through its boot-up sequence, then the display will read: IDLE M1 with the ONLINE light on. When the ONLINE light is on, the plotter is ready to receive data from the host. No changes to control panel settings can be made in ONLINE mode.

The control panel is shown in Figure 4.1. It consists of an LCD display, three condition lights and six buttons.

4.3 CONTROL PANEL

Figure 4.1. Control panel

BUTTON	FUNCTION
ON/OFF LINE	Toggles between ONLINE and OFFLINE modes. The menus cannot be accessed while online/idle except for the plot kill function (CUT MEDIA button) which only works if the plotter is receiving and plotting data. Once offline, the user can form-feed, advance media, move through the menus or cut the media.
FORM FEED	Will cause plotter to form-feed while plotter is OFFLINE, up to 99 inches.
MANUAL ADVANCE	Will advance media when button is pushed and held, while plotter is OFFLINE. Also used to select or deselect a menu item to access sub-menus. Deselecting will save settings.
CUT MEDIA / ARROW UP	Will cut media while plotter is OFFLINE. This button is also used to move to the previous selectable item when selected. If an item is selected, the flashing arrow will be displayed and current settings for that item can be changed. This button will also cause a plot to be terminated while plotting.
TEST PLOT / ARROW DOWN	This button is used to move to the next selectable item. If an item is selected, the flashing arrow will be displayed, and current settings for that item can be changed.
MENU SELECT	Allows movement to the next available menu screen when plotter is OFFLINE.

Table 4.2. Control panel button functions

4.4 MOVING THROUGH THE MENU SELECTIONS USING THE CONTROL PANEL

Plotter must be OFFLINE.

Menu Select

Accesses user modes and function menus. Scrolling is from first to last only.

Arrow Up (Cut media) or Arrow Down (Test plot)

Moves the arrow up or down to the item you wish to change. When an item is selected, pressing up/down arrow button causes changes to selection.

Manual Advance

Selects and deselects the item you wish to change.

Deselecting an item will cause changes to be saved.

NOTE: An item is selectable when an arrow is displayed, and changeable when arrow is flashing. You can only move to another menu item if there is one or more equal (=) signs elsewhere on the screen. Holding down the up or down arrow key while a menu item is selected, will scroll through the item options until a menu limit has been reached or the arrow key released. To run a test plot: Press ON/OFFLINE, press menu select until you reach the test plot screen, scroll down using down arrow key, press manual advance to select item, press up arrow key to change from "NO" to "YES". The plot will begin after about 3 seconds and will automatically change the menu item from "YES" back to "NO" once the plot is finished. The CUT MEDIA button will terminate a plot during plotting and will continue to kill jobs until a remote form-feed or end of transmission is received.

4.5 CONTROL PANEL FUNCTIONS AND SETTINGS

Control panel settings are saved as presets for either USER M1 or USER M2. Presets are initially set to defaults for all menu functions.

Changes to function settings are stored upon pressing MANUAL ADVANCE. Changes are retained even while the main power is *off*.
To restore the default settings for both USER modes, turn the power switch on while pressing down the MENU SELECT button.

User Mode

Allows the user to select between two user defined settings (eg. User Mode 1 for film; User Mode 2 for paper). To access functions in either user mode: Select ON/OFFLINE, press MENU button until user mode is displayed, press MANUAL ADVANCE to select, arrow will flash, press up arrow, deselect item by pressing MANUAL ADVANCE again.

Contrast

Changes the overall darkness of the plot. The default is 0 and changes up and down to +4 and -4. After performing a test plot or plot job, determine if the contrast is acceptable. If the output is extremely dark, very faint, or irregular, first check that the media setting is correct (see "Media" section of this chapter).

If the contrast still needs adjusting, change the contrast setting by pressing the up or down buttons in the CONTRAST sub-menu. Starting at the lowest value, adjust the contrast one value at a time, testing after each adjustment. This is particularly important when using lightweight papers or papers with unknown specifications.

CAUTION: Thermal plotting technology involves high temperatures. Incorrect media or contrast settings can damage the printhead or other components and void the warranty. Media damage can also occur.

Speed

The speed function adjusts the speed of the plot output. The default is 1/8" per second. The speed limit for film media is 1/4" per second The maximum speed for a given dpi setting is approximately 2" per second in 200 dpi mode and 1 1/4" per second for 400 dpi mode. Change the speed by selecting the speed option in the appropriate menu, and moving up or down the scale by pressing the up and down arrows. Deselecting will save changes.

If the plot speed is erratic, or if output quality is unacceptable, lower the plot speed. Such problems may arise when data enters the plotter at a slower rate than the plotter is set for. This is most likely to occur on the MAX setting. Lowering the plot speed enables the plotter to match the input rate of data and produces a smoother, better quality output.

When the media setting is FILM, the plotter adjusts the speed for maximum quality, printing at 1/4" per second (see "Introduction" in Chapter 5, for more details).

Plot type

Allows for mirroring of plot.

Test plot

The TEST PLOT function allows the user to generate a test plot. Six inches of plot are produced in a checkerboard pattern. This enables the user to see if the plotter is creating a plot image, feeding the paper correctly, and if contrast levels and media settings are acceptable.

To change from the default TEST PLOT setting of NO, press the up button in the TEST PLOT sub-menu to display YES, then press the MANUAL ADVANCE button to enable the test.

NOTE: Plot creation takes about 4 seconds before plotting.

Media

Allows the user to select supported media types. The default setting is "No Top Coat Paper", displayed as "NO T.C. P". Note that if you are using other media, you must adjust the media setting. Incorrect settings can damage the printhead. If unsure of the media specifications, start at the NO T.C. P setting and then increase the setting to T.C. PAPER if necessary.

Change the media setting by pressing the up or down arrows in the MEDIA sub-menu. Select LT PAPER (light paper), HV PAPER (heavy paper), or FILM. Note that in FILM mode the printhead's normal setting for contrast is raised. This requires a slower plot speed (see Speed section of this chapter). Do not use film settings on any other media other than film.

CAUTION: Thermal plotting technology involves high temperatures. Incorrect media or contrast settings will damage the printhead or other components and void the warranty. Media damage can also occur.

Scan width

Unless you are using RLTER (remote line terminate) commands, plotter scan width must be set to the same byte count as the rastered data from the host. Setting the scan width higher than the byte count of the raster data does not create a wider plot. Setting the scan width incorrectly results in skewed output as the data "wraps" and finishes the scan on the next line. This condition is easily seen on the plot (see Figure 7.4.)

DPI/BPS

Controls the way the data is accepted from the host and how to terminate it. The dpi is the number of dots per horizontal inch and the BPS (bytes per scan) controls where the data is terminated at the end of every scan.

The 592 BPS mode generates a 24" wide plot at 200 dpi.
The 888 BPS mode generates a 36" wide plot at 200 dpi.
The 1184 BPS mode generates a 24" wide plot at 400 dpi.

The 1776 BPS mode generates a 36” wide plot at 400 dpi.

Change the scan width setting in the scan width sub-menu.

NOTE: 200 dots per inch (dpi) is simulated by doubling up every dot in a given scan and plotting two scans on paper for each scan of data.

V-Emulation

The VERT RES function adjusts the vertical resolution of the plot (along the media length). The default setting is 400 scans per inch (equal to 400 dpi). Note that the horizontal resolution is determined by the printhead dot density, which is 400 dpi.

To change, select the V-EMULAT menu and select up or down arrow to desired emulation. Deselecting will save settings.

Scaling

Used to compensate plot length measurement due to tolerances in media thickness, roller diameter and head pressure. The amount of change is up to +/- 120/64” or +/- 1.875” of plot. The default setting is 0.

Change the scaling setting by pressing the up or down buttons in the SCALING sub-menu. The up button accesses positive (stretch) increments from 3/64” to 120/64” (1.875”).

FF Length

Adjusts the length of media moved (in inches) if a manual form-feed, remote form-feed, or an end of transmission (EOT) is detected, up to 99 inches. The default setting is 5 inches.

Top -of-Form (TOF) Adjust

Advances the media for a set distance after a top of form is detected. This is to compensate for manufacturer's different placements of the TOF mark from the perforation.

End of Transmission (EOT) Cut

If enabled, a media cut will be performed after a remote end of transmission is detected, and at the end of a form-feed.

Nib Save

This option can prolong head life if plot borders and vertical lines are used often, since they are usually plotted in the same horizontal position on the page. By moving the location of the vertical lines between different plots, wear is spread out to the different areas of the head. NIB SAVE can enable the plot to be shifted on different plots horizontally between the sides of the page or can lock down the positioning to a specific location. When enabled, the plot shifting will occur on a remote form-feed or end of transmission.

Hysteresis Adjust

Adjusts the contrast (darkness) of any dither pattern excluding solid black.

THEORY OF OPERATION

5.1 INTRODUCTION

The V36 plotter uses thermal technology to image incoming data directly to the thermal sensitive media. The plotter electronics receive the incoming data and sends it to the thermal printhead. Once a complete scan of data has been loaded into the head, the scan is imaged onto the media. Then the media is advanced for the next scan. This cycle is repeated until all the data has been imaged.

The scan is made up of 14,208 bits. Each bit within the scan addresses an individual nib in the printhead. Plot patterns are generated one scan at a time, each scan consisting of a horizontal row of black dots. Each dot position corresponds to one particular bit in the 14,208 bits which make up the scan. If a bit is "1", a black dot is printed on the media in the position corresponding to the bit position in the buffer. Selected nibs are heated, causing a thermo-chemical reaction with the coating of the media, resulting in a black dot.

5.2 PLOTTER FEATURES

Platen drive roller

The V36 plotter uses one roller driven by a stepper motor to perform two functions:

1). Media movement.

2). Platen surface backing pressure for the head.

This results in few moving parts and high reliability.

Media cutter

The V36 plotter is equipped with an automatic media cutter. The cutter consists of a hardened steel cutting wheel that is driven by a stepper motor and drive cable. The cutter can be activated from the front panel if set in menu or from a remote end of transmission (EOT) through the Versatec interface.

Top of form detect / media out

The V36 plotter contains a dual optical sensor pod that combines media out detection and top-of-form (TOF) I-mark detection. The sensors use infrared light, eliminating mechanical switches.

The top-of-form sensor consists of a focused infrared beam and receptor that reacts to black top-of-form marks. The receptor sends a "stop form feed" command to the logic circuitry if a mark stops the beam from reflecting back into the receptor.

The paper sensor consists of an unfocused infrared beam and receptor. If the receptor receives enough reflected light, the receptor will send no command. If the reflected light is below the required level, the receptor sends a "paper out" command to the logic circuitry and plotting stops. NO MEDIA is displayed on the control panel.

Top-of-form marks must be positioned on the media according to the specifications shown in Appendix F.

Interlock switches

The V36 plotter is equipped with two lid latch interlock switches to prevent the plotter from operating when the lid is not fully closed. This prevents damage to the thermal printhead.

THEORY OF OPERATION

Data rates

The following table shows the required input data from the host to the V36 to support the different plot speeds.

Plot Speed	Minimum Data Rate
0.125 inches/sec	88.8 kB/sec
0.25 inches/sec	177.6 kB/sec
0.50 inches/sec	355.2 kB/sec
0.75 inches/sec	532.8 kB/sec
1.0 inches/sec	710.4 kB/sec
maximum	1065.6 kB/sec

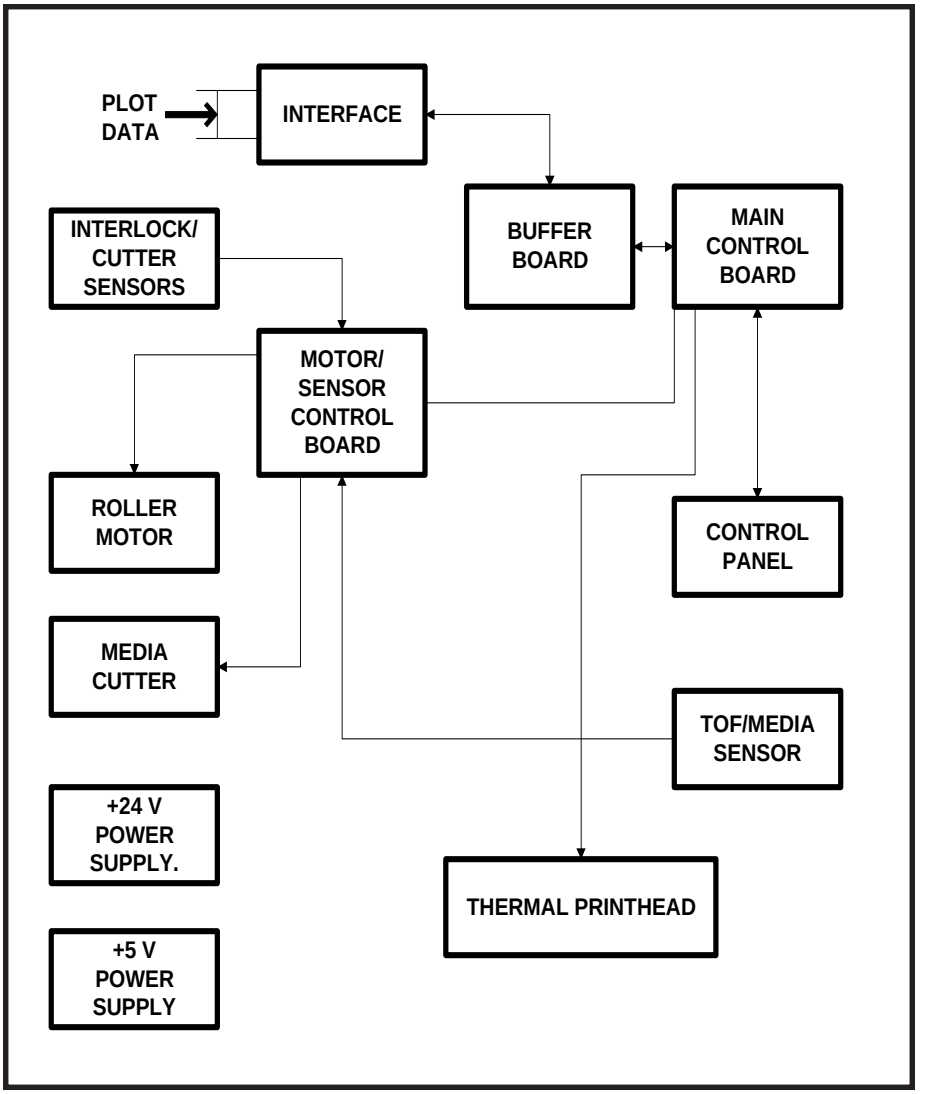
Print mode

When the host asserts the PRINT mode signal, the plotter can generate ASCII characters.

ASCII characters are produced as plot patterns on a matrix through the use of a Character Generator ROM. When one complete print line of ASCII-coded data is received, the data is converted into plot patterns. Each character line is executed over 40 plot scans.

The 96 ASCII characters are coded as shown in Table E.1. Control codes are shown in Table E.2. (see Appendix E).

5.3 FUNCTIONAL BLOCK DIAGRAM



A P P E N D I X

C E N T R O N I C S I N T E R F A C E

The following are the two transfer formats that can be used with the optional V36 Centronics parallel adapter:

1). To place the V36 in raster mode, the following 3 bytes (hex) must be sent to the Centronics adapter card:

1B, 2A, 00

Once these 3 bytes are sent, rastered plot data can be sent to the plotter at any of the bytes/scan menu settings.

Once the V36 is set to raster mode it will remain in raster mode until the init line of the host Centronics port is pulsed or the plotter power is cycled. This will return the plotter to print mode.

2). For more flexibility, a 6 byte header can be sent before each scan of rastered data. This header allows variable bytes/scan plotting, as well as other commands described below. The format of the 6 byte header is:

1B, 2A, 72, XX, YY, 01

where XX = high byte of bytes/scan
where YY = low byte of bytes/scan

NOTE: Make sure scan width in menu is set higher or equivalent to rastered data.

Example: To send a plot that is rastered to 200 bytes/scan, send the following 6 byte header before each and every scan of 200 bytes:

1B, 2A, 72, 00, C8, 01 00C8 hex = 200 decimal

For a plot consisting of 1776 bytes/scan, send

1B, 2A, 72, 06, F0, 01 06F0 hex = 1776 decimal

Other commands that can be sent to the V36 Centronics adapter:

1B, 41	remote clear
1B, 42	remote line terminate
1B, 43	remote end of transmission
1B, 44	remote form feed
1B, 45	remote reset

The V36 plotter also obeys standard control characters which must be sent when the plotter is in print mode:

04	end of transmission
0A	line feed
0C	form feed

NOTE: Print mode on the V36 means that all bytes that are received by the plotter are interpreted as ASCII characters and printed at 444 characters per line.